

# Virginia Stream Assessment & Compensation Methods

## A Comparison of Two Regulatory Agencies' Approaches



# Project Description

- Reason for Performing Stream Assessments
  - 80,020 l.f. Impacts from Proposed Reservoir
- Reason for Using Both Methods
  - Regulatory Quandry, Little Add'l Effort Req'd
- Watershed Description
  - Silviculture, Pasture, and Hay Production

# Assessment Metrics

## o Corps

- Channel Incision.....
- Bank Stability
- Instream Habitat
- Sediment Deposition
- Riparian Areas
- Channel Alteration

## o DEQ

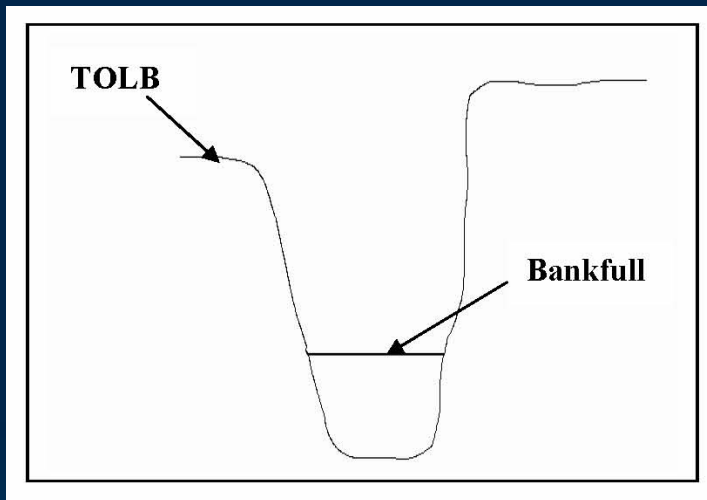
- Channel Condition
- Instream Habitat
- Riparian Buffer
- Channel Alteration
- Man-Made vs. Natural Channels

# Method Comparison

Corps

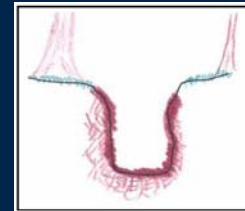
DEQ

Channel Incision vs. Channel Condition

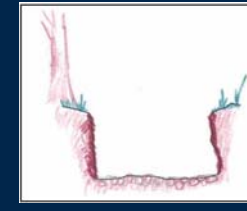


Uses Bank Height Ratio

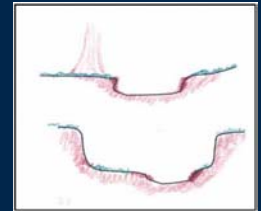
Severe



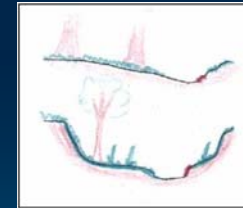
Poor



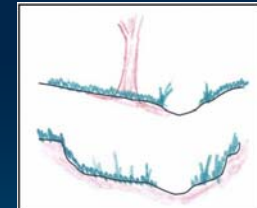
Marginal



Suboptimal



Optimal



Concern: Corps Requires Understanding and Correctly Identifying Bankfull;  
Can't Find Bankfull in Incised Channels = Compounds Error!

# Method Comparison

## Corps Riparian Areas

Very Specific

Right Bank	% Riparian Area >	100						100	
	Score >	10							
Left Bank	% Riparian Area >	100						100	
	Score >	10							
4. These calculators are provided for your convenience and may be used to calculate % Riparian blocks. They are not mandatory field									
Square Footage Area Calculator				Percent Riparian Area Calculator					
Enter Width	Enter Length	Square Footage		Enter Square Footage	Enter SAR	% Riparian Area	Rt Bank CI >	1.0	CI
							Lt Bank CI >	1.0	
300	37	11,100		10,000	1000	0.05			1.00

## VS. DEQ Riparian Buffers

Generalized

### 2. Riparian Buffer

<u>L Inner</u>	<u>L Outer</u>	<u>L Bank</u>	<u>R Inner</u>	<u>R Outer</u>	<u>R Bank</u>	<u>Overall</u>
○	○	○	○	○	○	○ Poor
○	○	○	○	○	○	○ Marginal
○	○	○	○	○	○	○ Suboptimal
○	○	○	○	○	○	○ Optimal

# Method Comparison

Corps

Instream Habitat\*

vs. Instream Habitat\*

DEQ

(High-Gradient) (Low Gradient)

Optimal	>50%
Suboptimal	30–50%
Marginal	10–30%
Poor	<10%

Optimal	>70%	>50%
Marginal	20–70%	10–50%
Poor	<20%	<10%

\*Based on EPA Rapid Bioassessment Protocol  
Epifaunal Substrate/Available Cover Metric



# Instream Habitat Concerns

- Corps Lumps Coastal Plain and Piedmont Together
- Corps Optimal Score Is Too Low
- Corps Tends to Give Higher Scores
- DEQ Needs Definitions for High/Low Gradient

# Instream Habitat Results

**Corps**

**vs.**

**DEQ**

Optimal	38%
Suboptimal	24%
Marginal	38%
Poor	0%

Optimal	24%
Marginal	65 %
Poor	11 %

(Using 37 data points from Compensation Streams)



Virginia Stream Assessment &  
Compensation Methods Comparison



Joint Public Meeting-05/24/06

# Results of Impact Assessments

- 80,020 linear-feet, 15.2 miles of streams assessed
- 115 stream reaches and data points collected

Scoring Bracket	% of Total Stream Length	
	Corps	DEQ
Optimal	15%	14%
Suboptimal	77%	74%
Marginal	8%	12%

Exceptional, Poor, & Severe 0



Virginia Stream Assessment &  
Compensation Methods Comparison



Joint Public Meeting-05/24/06

# Results of Compensation Assessments

- 167,904 linear-feet, 31.8 miles of streams assessed
- 37 stream reaches and data points collected

Scoring Bracket	% of Total Stream Length	
	Corps	DEQ
Optimal	24%	22%
Suboptimal	73%	70%
Marginal	3%	8%
Exceptional, Poor, & Severe	0	0



# User-Friendliness

- DEQ Method is...
  - Faster to Perform than Corps'
  - Easier to Use
  - Collects Less Data
    - Is Less Data a Concern?
- Corps Method Is...
  - More Quantitative vs. Qualitative
  - Scoring Range is Broader
    - Corps: 10-11 vs. DEQ: 3-5

# Comparison of Results

- 97 of 115 (84%) of Impact Reaches Fell into Same Scoring Bracket
- 26 of 37 (70%) of Compensation Reaches Fell into Same Scoring Bracket
- When Different, Corps Method Scored Higher 19 Times; DEQ Method 8 Times
- When Different, Scoring Brackets Were Adjacent
- Land Use and Stream Order Don't Appear to Cause Differences



# Why Is Corps Score Higher 19 Times?

Corps

DEQ

- 12 of 19 Channel Incision > Channel Condition
- 15 of 19 Sediment Deposition > Instream Habitat  
(DEQ Has No Metric for the 2 Criteria Above)
- 0 of 19 Bank Stability
- 0 of 19 Riparian Areas
- 9 of 19 Instream Habitat > Instream Habitat
- 0 of 19 Channel Alteration

# Corps Channel Incision

- Provides Too High a Score for Entrenched Streams ( $BHR \geq 2$ )
- Adjustment Factor Needs to Be Applied Before BHR Reaches 3

# Method Comparison

**Corps**

Sediment Deposition vs.

Deposition

**EPA RBP**

Sediment



Optimal <20%

Optimal <5% <20%

Suboptimal 20–50%

Suboptimal 5–30% 20–50%

Marginal 50–80%

Marginal 30–50% 50–80%

Poor >80%

Poor >50% >80%

Concern: Corps Sediment Deposition Thresholds for Piedmont Streams  
Based on EPA RBP Low-Gradient Instead of High-Gradient Systems



# Corps: Optimal, DEQ: Optimal



# Corps: Optimal, DEQ: Optimal



# Corps: Suboptimal, DEQ: Suboptimal



# Corps: Suboptimal, DEQ: Suboptimal



# Corps: Suboptimal, DEQ: Suboptimal



# Corps: Suboptimal, DEQ: Marginal



# Corps: Marginal, DEQ: Marginal



# Corps: Marginal, DEQ: Marginal



# Assessment Conclusions

- Corps Method Gathers More Data; Slower
- DEQ Method Easier & More General; Faster
- 81% Avg. Correlation Between Methods Means...
  - Faster Method Seems Sufficiently Accurate
  - Less Detailed Seems Sufficiently Accurate
  - Integration of Methods Should be Reasonably Rapid
- That Then Leaves the Compensation Issues!

# Mitigation Plan

- Identified Large Stream Preservation Opportunity with Some Stream Enhancement & Restoration Avail.
- Collected 37 Data Points Attributable to 31.8 Miles of Streams
- Extrapolated to 64+ Miles of Stream
  - By Stream Order

# Mitigation Plan – Corps

- Preservation Compensation Ratio of 5 : 1
  - Stream Must Score at Least a 3 (Suboptimal or Better)
- Enhancement Compensation Ratio: Unknown
  - Using Avg. Condition of Marginal Reaches (RCI=2.88) and an Assumed Condition of the Enhanced Reaches (RCI=4.54), Compensation Ratio Is Approx. 2.5:1
- Cattle Fencing with Buffer Planting Does Not Qualify as Providing Lift

# Mitigation Plan – DEQ

- First Multiply By Stream Quality Factor 1.3
  - (15.16 Miles X 1.3 = 19.17 Miles  
EXTRA MILES of Compensation)
- Then Apply Preservation Compensation Ratios
  - 5:1 for Optimal Streams Preserved
  - 10:1 for Suboptimal Streams Preserved
- Enhancement Ratio Ranges from 1.5 to 3.75:1
  - Used approximate ratio of 2:1



# Mitigation Results

- Using the Same Mitigation Plan for Both Methods...
- DEQ: Provides 47% of Compensation Needs
- Corps: Provides 87 % of Compensation Needs

# Mitigation Results–Mod. 1

- Using DEQ Method Without SQF (1.3)
  - Provides 61% of Compensation Needs
- Using Corps Method
  - Provides 87 % of Compensation Needs

# Mitigation Results–Mod. 2

- Using DEQ Method without SQF (1.3) and with 5:1 Preservation Ratio (like Corps)
  - Provides 93% of Compensation Needs
- Using Corps Method
  - Provides 87 % of Compensation Needs



# Mitigation Conclusions – Corps

- Cannot Predict Compensation Requirement Without Known Site and Site-Specific Data
- Unclear
- Requires Numerous Judgement Calls to Determine How Lift Is Achieved
- Places Double Importance on Channel Condition and Habitat over Riparian Buffers and Channel Alteration
- Field Conditions Don't Appear to Support RCI of 3 for Preservation



# Mitigation Conclusions – DEQ

- Can More Easily Predict Compensation Requirement
- Clearer
- Requires Substantially More Mitigation
- SQF Seems Unreasonably Burdensome



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